

AVIATION WEEK

A MCGRAW-HILL PUBLICATION

MAR. 31, 1952

50 CENTS

Now the Boeing KC-97A Flying Tanker Lowers the Boom on Icing Problems



ICEGUARD PROTECTION on rudder/elevator surfaces controlling refueling boom. Smaller picture shows KC-97A in flight refueling of B-50.

PLANE-TO-PLANE refueling in flight is a delicate operation, particularly the guiding of the flying boom on the tanker to the inlet on the second ship. It's accomplished with "rudder-elevators"—combination rudder-elevators at the end of the boom. Because the slightest amount of ice on these guiding surfaces would cause trouble, current production of the rudder-elevators on Boeing's KC-97A relies on Goodyear's Iceguard to prevent ice formation.

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Iceguard—T. M. The Goodyear Corp.



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is equipped with **ZENALOY*** parts by **ZENITH**

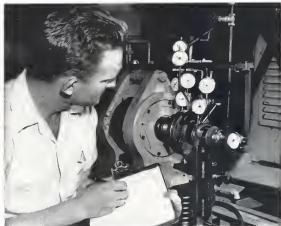
The jet propelled Conquest RB-36 equipped with the most powerful engines ever installed in an airplane, is designed to serve in all environments and in the Stratosphere. It operates in the stratosphere, at a speed over 1,000 miles per hour, and its mission is to seek out and destroy the enemy. Each necessary part is made here, in the United States.

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NEWS DIGEST

DOMESTIC

Graded Martin division has been established by Republic Aviation Corp., with office at 99 Broadway, New York. Robert G. Martin is general manager, James H. Brewster is director of sales contracts, and Philip F. A. Stone is director of engineering.

Sikorsky S-55 helicopter has been certified by CAA, clearing the way for civilian operational use. Los Angeles Airlines has \$1.55 on order for its first scheduled passenger service.

First on delivery of USAF Republic F-84 Thunderbolt fighter bombers to a NATO nation was made Mar. 24, with three planes being flown to France via Labrador, Iceland, Greenland and New Ireland without stops.

Profits and ship shipments during 1951 totaled \$100.1 million, representing a 50% increase over 1949. Military shipments accounted for 51% of the total, valued at \$81.2 million.

North Atlantic certificates of FNA and TWA should be made permanent recommendations. CAB Executive Frances Brown. He adds that PanAm's service to Paris and Rome and FNA's to Frankfurt and London should run for five years only. Brown also recommends denial of European Airlines Authority proposal to operate a non-scheduled trans-Atlantic air freight service.

Looking Intercontinental Flying Trophy has been awarded to a company representing and various countries. Given looking to be awarded annually to leading U.S. college flying club. National Aeronautic Association will administer the award, with first presentation scheduled for announcement at National Intercollegiate Air Meet, St. Louis, Mo., Mar. 9-10. Last winner was the team of Michigan, in 1949.

FINANCIAL

Boeing Airplane Co. reports profit after taxes of \$7,142,251 for the year ended Dec. 31, 1951, on sales and other income of \$137,975,456. For 1950, profit after taxes was \$10,028,358 on sales and other income of \$187,506,362. Booked at the 1951 year end was \$1.35 million.

Lockheed Aircraft Corp. reports profit after taxes of \$5,793,461 for the year ended Dec. 31, 1951 on sales and other income of \$241,394,349. For 1950, profit after taxes was \$7,190,916 on income of \$174,386,259. Booked at the 1951 year end was \$970,415,890.

Republic Aviation Corp. reports profit after taxes of \$2,951,613 for the year ended Dec. 31, 1951, on sales of \$174,440,552. For 1950, profit after taxes was \$2,355,084 on sales of \$157,713,432. Booked at the 1951 year end was more than \$533 million.

United Air Lines' new 225,865 shares of immediate preferred stock will have 4.5% dividend rate and each share will be convertible into 1.15 shares of common, according to a final memorandum in UAL's registration statement with SEC.

Western Air Lines received a \$194,875 net profit after taxes on its 1951 operations. General authorized a 15-cent-per-share dividend on Mar. 31 to holders of record on Mar. 24.

Pacific Aeronautics Corp., Burbank, had complete sales of over \$2,587,000 for January, a 60.5% increase over the same period last year. In 1951, total sales were \$23,438,229 and net income after federal income taxes was \$749,874.

Boeing International Airways reports net profit of \$1,515,000 for 1951 with revenues totaling \$25,736,000.

Northeast Airlines had operating revenue of \$3,311,751 for February. After \$594,800 adjustment for income tax accruals, net loss was \$335,278.

Trans-Canada Air Lines reports 1951 was most successful year the carrier has ever had. TCA flew 954,081 passengers, transported 1.4 million tons of cargo and 1.2 million mail tons at an expense of \$100 million in the year.

INTERNATIONAL

Republic RF-80F photo reconnaissance version of supersonic Thunderbolt with "solid" nose and wing slots by Wright-Patterson Supply Airfield is being.

KLM DC-6 crashed during poor weather in a Frankfurt, Germany, skid on Mar. 22. Lifting off of 47 doors. Dead, all on, however, later brought toll to 41.

English Electric Canberra two jet bomber has approximately 10,000 orders from England to Sweden, Australia, in 23 to 26 mm. Long term, clipping three hours from a Canberra week.

Lockheed transport crashed while taking off from Gate 7, March West Africa, on Mar. 24, lifting 16 of 19.

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WHATEVER YOU FLY



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Small and lightweight, G-E's new ultralight voltage regulator is both fast and precise. Voltage regulation on load is held to less than $\pm 0.5\%$, while recovery to $\pm 0.5\%$ of rated voltage occurs in less than 0.5 seconds after release from extreme load drops of load.

Strength and dependability are built directly into the regulator. Operation is unaffected by altitude, pitch, roll or yaw. In operation, there are no tube elements, no fragile components, almost nothing to wear out. Operation is good to above 35,000 ft., and between -87°F and $+140^\circ\text{F}$.

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New Static Regulator for Aircraft Alternators Has No Carbon Stacks

Can withstand 10-G acceleration; Remains stable throughout life

Designed to military specification MIL-G-6089, this compact new static type voltage regulator eliminates routine maintenance, reduces replacement costs, provides better aircraft electric system performance under extremes of altitude and temperature and eliminates exciter reversal problems. Both small and rugged, the regulator is designed to control G-E's new line of high performance aircraft alternators.

Note these significant features:

- Expected useful life above 3000 hours
- No carbon stacks
- Ready to operate—no warm-up required
- Can be used with alternators either wye- or delta-connected
- Negligible voltage drift with temperature



WHO'S WHERE

In the Front Office

Robert F. Wick has been named president of Continental Air Lines for the 14th consecutive year and Joseph A. Mum has been named its senior vice president. Both have distinguished war production records.

Changes

William H. Gibbons has been appointed advertising manager of Transair Products, Cleveland.

Edward H. Johnson has been named regional director of Fleetcraft Aircraft (Baltimore) Ltd.

Robert L. Stowley has been made vice manager of Colonial Airlines.

Mark E. Martin has been designated as president of technical support and operations by the Texas Aerospace Committee, according to G. E. Giffert, who resigned effective Apr. 29 to enter the automobile business.

D. F. Thibault has been named chief pilot for Philippine Air Lines' international division. Thibault will be in charge of the carrier's expanded DC-6 and DC-6B touring program.

Charles W. Timmer has been designated general sales manager for Royal Airlines.

Bob Van Doren has been named general director of General Canada Co., Glendale, Calif., as its new territory sales manager.

Frank L. Appell, formerly director of training for Cal-Neva Airlines, Inc., has been appointed plant manager of Grand Central Aircraft Co. for its Glendale facility. Appell is Cal-Neva's J-1B Strakehead vice president but just as school superintendent Alexander Friedman has passed development laboratories of Ryan Aeronautical Co. San Diego, as staff engineer. He came from Cals. Co. Sales Mfg. Co., Trenton, N. J.

What They're Doing

Start D. King, formerly of General Electric, who has been named vice president of the H. K. Thayer Aircraft Corp., is making modifications and other aircraft sale models. The firm is located at 45 Virginia Park, Buffalo, N. Y.

Wendell F. Shivers is managing in Design Director General of the National Aeronautics Administration, effective Apr. 15, his parents and family remain. He is manager in their. Thibault was appointed to ANTA as December, 1952.

Honors and Elections

John B. Lee has been presented a special gold medal by the National Aeronautics Administration for services in recognition of his having served faithfully and with devotion in NACA's representative as a delegate from 1912-1946.

Dr. Edward H. Lindbergh of the Alaska Foundation has been awarded the first and most Arnold D. Tiedt award by the Aero Medical Association for research in aviation medicine. He was particularly noted for his work in aviation medicine and in the perfection of blackout suits for military personnel.

INDUSTRY OBSERVER

Interlocking Anglo-American interests are going on between the axial flow Armstrong Siddeley engine which Gerni Wright builds at the 165, and the centrifugal flow Pratt & Whitney J48 which started life as a Pratt & Whitney design called the T-1. New's recent announcement that the 1190-hp engine is being tested with successful indication that this model has a thrust rating of around 7,200 lb., or about 1,000 lb. more than earlier J48s. It goes into the new, surprising Navy Gressman engine T-1. The old, hardly was dry on the New's previous release before, Armstrong Siddeley was producing that a new version of the engine had been in flight from 7,200 lb. to 7,800 lb. in a 150-hp type test at the higher power.

Unofficial record for sustained flight in a jet fighter was believed set recently by a Republic F-84F Thunderbolt when it flew for 12 hr. 5 min. with four semi-subsistence from a Boeing B-29F Superfortress. Fighter pilot, Lt. Walter G. Hodges, 43rd Fighter Escort Wing, lost that ground in flight, but it was in good condition at the landing at Edwards AFB, Calif.

Evidence of how much USAF attention was paid to the element in was, contacts in the Detroit area is surely the latest view appears in recent sessions of military plane schedules. Kasey-Thibault didn't get into main plane orders for the Willow Run, but he had kept his, held steady at C-119, the same, which, other plane manufacturers, including Fairchild, the original builder of the C-119, took a sharp turn away. This confirms in Aviation Week forecast (Jan. 21, p. 14) that the K-F engine program would be based from the general product. Specifically, the Willow Run contract for 158 USAF C-119s, remains unchanged. The rest of the Willow Run C-119 production is 23 C-119F, 18 for NATO and 3 for RCAF. The older schedule called for 21 C-119G, all for NATO.

Lockheed reports it has spent nearly half a million dollars in computer results in the last two years in developing its new jet transport design, including a series of wing tests in the Cal Tech high speed wind tunnel and other aerodynamic and structural studies to reduce weight and increase cruising speed of the plane for which it still has no definite order.

Virtually the only difference between North American's F-86F jet fighter which was to phase out this month, and the F-86F, which replaces it, is in the late and more powerful J47 GP-7 engine which goes into the F-86F, instead of the J47 GP-13 which powers the earlier plane. With the phaseout of the F-86F, North American will be making the F-86D under-equipped model-armed aircraft, and the F-86F an expensive fighter of the Los Angeles Airport plant. At North American's Colville plant in the north, parallel from all F-86F's for the Air Force and the Navy F-12 which is a more fighter adapted than the F-86F.

Pennco's first H-33 Air Force rescue helicopter is due to take the air for the first time at the Morton, Pa. plant late this week. The H-33 is powered by a 1,150 hp. Wright R-1820-165 and carries more than 15,000 lb.

An transport mobilization plan was presented to 130 airline executives and other officials last week at a meeting with AF Secretary, President, MATS Commanders Maj. Gen. Joseph Smith, and Defense Air Transport Administration Ben Ireland. Gen. Smith outlined the program generally calling for an airline reserve fleet of 367 four-engine planes, of which 111 would be available in 48 hours. A final, source of 51 planes would operate regular flight schedules throughout the mobilization, the remaining reserve of 240 would fly only during peak load requirements at MATS. During the last month of reserve fleet operations, the reserve fleet would increase from 111 to 367 at high-capacity DC-6s, modified to meet cargo specifications to replace 15 light-weight DC-6s and 51 light-weight DC-4s.

with both in the apes and in Wash- ington pending and his assets have completed," he said. "I have heard no news for Mr. McConnell's transfer except for the good of the cause."

Ellis's cultured voice was firm. "This isn't a man in CAA," he continued emphatically. "who is not will- ing to be transferred for the good of the cause."

It had his varied associations of collisions between CAA and CAA again in an attack upon the integrity of CAA. "I have served under an Administration and I have not to hear of anything between CAA and CAA except having proposals on which they agreed or disagreed."

▶ **Puncturing People-Head** asked if well if the CAA owned had any argu- ments for the committee. Ellis launched into an impassioned plea for the meaning of ethics, noting that the committee had been isolated before the committee that have sprung up around them. He attacked the committee that CAA had worked out a recent indictment with the city of Newark for Newark field, only to have the state court rule it unconstitutional in the absence of existing statutes by the state legislature.

Young, he said, would have kept president man from the airport although as head quickly pointed out, the place left in Elizabeth out to Newark.

Ellis acknowledged this and the importance of seeing other out- side. And the lights glared brightly on deep, smoke-filled eyes that seemed to set the wheels of CAA's Old General stalk into the room as Ellis's voice rose to declare that "Stendish" was his to protect people against these whips."

New Jets to Get Rocket Armament

First official evidence that USAF jet fighters are moving towards rocket armament in place of the main conventional World warplane gun was made last week by Air Force Under secretary Ronald L. Gilpatric.

Gilpatric said that the North American F-105D armament was scheduled for rocket armament in place of main- stream guns. Prototype and subprototype have developed two others. These are the new Lockheed F-104C afterburner and the Republic F-105C which were tested against earlier North American F-105A fighter. The car was tested in addition to 10 new cases.

There is, however, increasing emphasis by both Navy and Air Force to give fighters and bombers heavier, more powerful armament. And as research



GE Shows -27 Version of J47 Jet

Lockheed, Ohio—A new member of General Electric's highest family, the J47 GE-27 now in production at the company's Lima, Ohio, plant and shortly will be built here. It is slated for installation in the North American F-105F Sabre and F-105F Fury and is rated at about 10% greater thrust than the F17 engine powering the Sabre in Korea.

Based on new features on the -27 are the high-altitude starting system, three- wheel landing gear and some accessory changes. Prototype component blades are longer than on earlier engines, the results in increased air handling and compressor ratio. And these have been used improvement in the specific fuel consumption.

▶ **Collaboration—Announcement** of the 27 engine was part of the May 18-19 celebration of the tenth anniversary of GE's first prototype test run. The anniversary also was marked by the dedication of the new Lockheed jet center. Upon completion, there will be nearly 4 million sq ft of production, office,

improving and administrative space at the site.

First buildings added to the basic facility (which was built during World War II for the production of Wright piston engines) were office and factory areas. These were replaced by general covering for the first time during the celebration. And in one of the brand new test cells, the J53, GE's latest competitive thrust and rated power fuel engine, also opened.

A handful of J47 engines were on the production line when the first com- mission of the factory tour was that there was a lot of open, non-productive space. But the factory layout has been planned for high production and 12,000 people, night now, only 3,300 employees are working at Lockheed, and nothing is impossible.

During the celebration, GE launched the jet program of the country. As part of the program, a "newcomer" engine—one of the first 1A jets built by GE—is unveiled by Lawrence Bell, whose company built the Bell P-99

design, according to reports from Air Force sources.

Most important of new air defense planes such as the F-104C and F-105D will not be directed towards enemy fighters. Instead it is designed to enter right corner locations.

▶ **Gun Here Here—But** at the same time Air Force, armament experts point out the use of the conventional machine gun and cannon is not just possible, in an aircraft reflects other than forward, they believe. They would find protective rocket armament of little value until an air machine can further developed.

So, in addition to development work in the field of missiles, both guided and unguided, Air Force and Navy are considering development of heavier caliber machine guns.

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MARQUARDT AIRCRAFT COMPANY, VAN NUYS, CALIFORNIA

FINANCIAL

Working Capital Changes

	1951	1950	Change
(in thousands)			
CONVAIR			
Cash and Receivables	\$2,176	\$ 7,426	\$ 5,250
Accounts Payable	1,176	20,279	19,103
Current Liabilities	25,424	18,894	6,530
CENTURY-REBERT			
Cash and Receivables	20,000	11,400	8,600
Accounts Payable	20,000	20,000	0
Current Liabilities	10,000	10,000	0
DOUGLAS			
Cash and Receivables	20,000	20,000	0
Accounts Payable	20,000	20,000	0
Current Liabilities	20,000	20,000	0
MARTIN			
Cash and Receivables	20,000	20,000	0
Accounts Payable	20,000	20,000	0
Current Liabilities	20,000	20,000	0
NORTH AMERICAN			
Cash and Receivables	20,000	20,000	0
Accounts Payable	20,000	20,000	0
Current Liabilities	20,000	20,000	0
RYAN			
Cash and Receivables	20,000	20,000	0
Accounts Payable	20,000	20,000	0
Current Liabilities	20,000	20,000	0

Banks Play Key Role in Air Plans

Heavy inventories tie up industry capital so return is made to World War II pattern of financing expansion.

Expanding aircraft production is now being financed on an ever-increasing scale by bank borrowing. This trend is evident by the annual reports now being released by representative air craft companies.

With one exception, the six companies examined and presented in the accompanying table have resorted to bank loans for necessary funds to finance present manufacturing programs. This practice is well known and follows the pattern of financing aircraft production during World War II.

An important element lacking in recent years has returned during the peak of the aircraft industry is capital financing. During the early stages of World War II a large number of aircraft companies sold capital stock in order to obtain permanent working capital to conduct operations. But with one exception, Marquardt, has resorted to equity financing during the post-war.

► **Banks Edge—**Permanent equity capital is now largely adequate for most aircraft companies. As late as the 1940s the outstanding profitable operations were not sufficient accommodations will be available in the face of self liquidation.

bank credit. Under such conditions, banks are eager to advance funds to finance the defense effort and are not themselves of Federal Reserve Bank. Visions with the Air Force or Navy serving as guaranties for the credit capital.

In view of the long term lag in the completion of production contracts, substantial funds are involved in the form of inventories and work in process. Until shipments are completed and payment received, cash resources are devoted to support inventory positions. At the completion of the cycle inventories are worked off and cash again built up.

► **Volume Counting—**Balance sheet accounts of aircraft companies clearly reveal preparation in the building for volume shipments to be made later this year or even during 1953.

► **Capacity, for example,** shows a gain of more than \$14.5 million in its net inventory position from Nov. 30, 1950 to Nov. 30, 1951. To finance this volume, the company had \$20 million in cash and cash equivalents at the 1951 year-end. A total of \$50 million in bank credit is available to the company in needed working capital re-

marquardt



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quarterly for Conair went somewhat
advised by more than \$15 million in
progress payments advanced by the
government.

•Douglas, despite a vast expansion in
its aviation program, received con-
siderable assistance in the form of
progress payments. Presumably a good
portion of these advances were received
from the aircraft with transports on
order. Total assistance aggregated
\$194.7 million for Douglas at the
1951 year-end, but through advance
and progress payments were reduced
to only \$77.3 million. Douglas has a
\$60 million bank credit but drew down
only half, or \$30 million, at Nov. 30,
1951. It is likely the balance of this
credit will be utilized during the cur-
rent year.

•North American Aviation has also
had to advance progress payments and
bank loans to finance its production.
At Sept. 30, 1951 the company re-
ceived progress payments of almost
\$97.2 million in advance on various
orders to \$15.6 million. In addition,
the company had \$20 million in notes
payable outstanding in order to obtain
needed working capital.

•Ryan Aeronautical, the smallest of
the companies reviewed, utilized \$9.1
million of its \$32 million bank credit
by Oct. 31, 1951. These funds were
applied to finance inventories and re-
ceivables due on the San Diego com-
pany's government contracts.

•Curtis-Wright is the only major air-
craft company which did not resort to
bank loans last year in order to finance
its huge production backlog. The com-
pany's cash and securities position dis-
creased more than \$67.5 million, largely
to finance inventories and accounts re-
ceivables due from the government. In
this and other instances, closeness of
the government departments to revo-
lutionary aircraft companies for re-
presentation in accounts receivable has
created an extra drain on working cap-
ital requirements.

•Fleetcor Financing—Most of the
bank loans extended so far in the form of
90-day notes receivable over a period
ranging from one to about three years.
This gives the borrower considerable
flexibility in financing peak production
requirements with the bank loans as
providing a self-liquidating nature.

Not shown in the accompanying table
but an important contributor factor in
the industry's ability to handle in-
creased production requirements is the
steady "throughput" or an action
of available earnings during recent
years. Such increased earnings were not
only contained in plant facilities and
costs in current months but helped con-
tribute to cheaper equity positions,
forming a broader base to facilitate bank
credit accommodations.

—Selig Ahtshel

A

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sheet,
extrusions,
bar,
tube,
forgings,
castings



and all the
tapered sheet
in the Northrop F-89
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AERONAUTICAL ENGINEERING

Poor Coordination Slows Missiles Work

- The United States will not get missile production in quantity until one office gets overall supervision.
- And an expanded Office of Guided Missiles with power to cut across channels might well do the job.

By David A. Anderson

Lack of overall coordination of missile projects may be the major stumbling block to the guided missile program in the United States.

In spite of charged responsibility for development of all auxiliary equipment—ground orders, servicing, inspection—there is little direct supervision of progress of an complete missile.

Instead, reliance is placed on the ability and initiative of each participant group to get its own job done on schedule.

Why Should We?—The agreement for overall coordination are backed by the experience of industry. There the procedure is to appoint a project engineer as coordinator. His particular duties cut across channels of research, development, test, production and sales. His responsibilities are defined by specific words which tell him in advance his control of the research, development and acceptance by the military service.

In this way progress—or the lack of it—can be directly traced to the efforts of one man.

It means placing a tremendous load on one individual. But the assault is directed in built on the concept of the project engineer and has made a success of the system.

But where the system does break down is beyond the doors of the prime contractor's plant.

For Example—Take the fictitious case of a long-range, high-speed missile being developed for U. S. Army Ordnance.

The contractor starts the research and development phases. During this time, he makes wind-tunnel test in the Ord. serv. facilities at Aberdeen Proving Ground.

He also uses the test facilities of other services, such as the excellent tunnel of Naval Ordnance at White Oak, Md.

When he requires certain test facilities and equipment of his own or where

building is involved, the Army Corps of Engineers enters the picture as one of the contractors.

When the contractor wants special test equipment, he must work with the Signal Corps. When he is going to test in a wind tunnel, he must get their from the Quarters of the Corps, and then in the Ordnance center and supply them with just supplied by the Signal Corps.

The workload for his missile may be developed either by Ordnance or by the Signal Corps.

Coordination—The project engineer works with the staff, and determines the responsibilities of the missile during all its life. He checks with the military service of the project to verify the need for field and service equipment. And he draws subcontractors and sees that they are in the program.

On his shoulders lies the responsibility of making a schedule for the various phases of development, test, production and sales. And schedules he does they put without common agreement, become mere project engineer's, at best, such as correspondence—and the missile proceeds.

Working with the project engineer, but in no way responsible to him, is some military representative. He gets the job of handling inter-service coordination and paperwork. If the Ord. serv. contractor needs to fire or test facilities, he goes to the military representative to work. The request is channelled through the proper lines of communication to the proper place. The proper number of copies is acknowledged, entered and then passed along for proper action.

And night there is where the big stumbling block is thrown in the way.

Takeaway—If out of these military branches of the service decide that it cannot do a particular job in the time allotted, or that it is up to its ears in work, a polite refusal goes back through the channels. And nothing can be done about it until some higher authority is able to get it. This is not across project engineer.

If the project engineer had authority, or if the military had the work, then these jobs could be done on schedule. But it is a wrong to be dependent on the initiative of people and even more so on the initiative of the military. It is wrong to be dependent on them who don't particularly recognize the needs of our job over the other.

The argument against the channeling of jobs is that it has to cut across too many lines of authority, and that things have always worked out well the other way. This is certainly true. But it's a weak argument, because industry has been operating by cutting through channels for years.

Suggestion—It's been suggested that the Office of Guided Missiles could undertake this task. But at presently concerned, the OGM is a very high level policy-making group which should not get involved with details. OGM's job is to determine what needs to be produced for the national defense, and to suggest how such needs are to be developed.

That's as presently conceived. But an expanded OGM could use the project coordinator advice in its own organization.

The OGM staff needs not be increased, but that many smaller units under development.

And high level coordination, or at least of the program, could be settled within the ranks of our, instead of being passed around from Pentagon to pillar to post.

Recommendation—If we are ever to have guided missiles in quantity, without needless and needless duplication of development and test facilities, we need to strengthen the Office of Guided Missiles. We need to give more power to its director and to his staff, so that per project, duplication and waste can be removed out of the program despite the cost of guided missiles. We need to assign the complete responsibility—and the necessary authority to do the job—on one place, to one group.

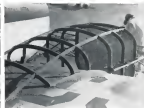
And then the guided missile will come into its own. It will come to be a mechanical plant, a political propaganda piece and a technical masterpiece. It will stand on its own merits as a technical concept which transcends the limited ideas of land, sea and air power as we know them today.



FLIGHT VIEW OF BI-NAVION shows the major changes from standard Navion—i.e., wing, powerplants and vertical tail.



LEFT NACELLE shows forward wing engine pylon pylon.



RIGHT NACELLE before showing shows simple structure.

TwinEngineered From Navion-Piper Parts

Dauby produces Bi-Navion conversion at a price which figures to be lower than for a new executive plane.

The two-engineered beast shows about as the Bi-Navion, a brand new development in light aircraft. It is basically a standard Navion airframe to which two Piper Porters powerplants have been added.

It was developed to fit a specific industrial problem—damaging both executive transport and field service time for Plastic and Rubber Products Co. And the total bill is expected to be less than the purchase price of such competitive craft as the Twin Bonanza or the Aero Commander.

Conversion was handled by the Duels Equipment Co., Inc. of Los Angeles, with F. W. Anderson retained as engineering consultant. Fabrication was

done by the Aero Aircraft Co., Torrance Municipal Airport, Calif.

► **What Was Wasted**—Kerosene of the entire conversion project was the need for the increased safety of a twin engine craft. Dauby had been operating a standard Navion for Plastic and Rubber Products and during 1951 had acted up 642 hours on the plane. This flight time was divided between executive transport and field service work on Plastic and Rubber's semi-mathematical "CP" maps.

Such a high total use of one airplane—542 hr. per year is a daily average of about 14 hr.—prompted thoughts of getting another plane. And because some of the flights were made under

conditions and over terrain that were considered unsafe for a single-engine plane, a twin was the definite choice.

At the time, there were no such small aircraft in production. So modification of the problem led to two choices—a new design or a conversion.

Economically, the conversion seemed to be the better choice. And from Anderson's engineering point of view, the company's Navion was a natural for conversion.

► **Power Components**—The first basic policy adopted was a simple one. Whenever possible, use proven components.

First and foremost of these was the standard Navion airframe. The particular ship selected for conversion was an early North American model with license N-91793.

To the basic airframe were added

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BI-Nylon Specifications

- Wing span 35 ft 4 in.
- Overall length 27 ft 6 in.
- Height at cabin 7 ft 2 in.
- Height at radiator 9 ft 5 in.

Two Locomotiv O 294 D four-cylinder opposed engines rated at 130 hp. ea. for takeoff. Semirigid Skyblade propellers, controllable pitch. 74 in. dia. main rotor.

two power packages—each are actually the power section from a Fager Parvo 1000. Egnager and Lyman say O 290 D, developing 130 hp each for takeoff and normal rated at 125 hp each. Propellers are controllable. Sencore Skystruts of 74-in. dia. Thus everything forward of the nacelle for each is adjacent to the Power Drive.

Location of the engine needles on the Nivara wing was determined by the available design constraints which

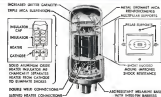
considered weight, aerodynamics, and structure. Aside from those three, I also want to control all aerodynamic details wanted to allow for additional fuel in the nacelle, and also for a more powerful engine. I think these changes

- **Thomson**, **Van-Anderson** - considered their basic types of needle structure
- **Tubulin** **nanotubes**, which were solid not because they would have concentric

- Coupler shear beams, which took not in-plane loads by differential bend one of the struts. This scheme was

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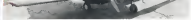
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RENAVION ON THE GROUND retains

erect and because surfaces should fit the structural plate covering most of the fuselage.

Some monocoque structure, which is the third design choice, such as a longitudinal channel distributed loads over the wing and the smooth skin would function as a load-carrying member in a self-reinforcing manner.

The aircraft design starts at the fuselage with the engine, pylon mounts. The fuselage is a complete ring with metal sheet walls. Behind the fuselage is a second complete ring frame. The third frame is split at the wing chord plane, and slips to the skin over the leading edge. From the third frame, there are two main spar rings.

All rings are of a laminated channel section, two upper and three lower struts, can pierce the rings and are clipped to them at each design with simple fasteners. All ends of each section is clipped to the ring skin.

A simple structural ring, carrying the wing to wing attachment clips on a horizontal and vertical axis of each pylon.

Wing and Tail-Wing modifications were not very complicated. The wing spars were extended into main add-on under the main fuselage, and due to the wing structure were reinforced locally to carry the extra loads. And some reinforcement was built up.

Single-engine performance criteria really demanded a larger vertical tail than was there were those prescribed by the Aviation. He could extend the standard Navion tail or build a new vertical tail or find an acceptable one.

There was not after major changes which stemmed directly from the two engine layout. A fuselage nose baggage section was dropped fitted with side seats.

Other changes included a new panel to accommodate nose instrumentation, and fuel tanks for better ground handling.

Scoping had been added, even

though the new level in the BuNa was correct, that of an inherently level level than in the standard Navion, because of the increased distance between engines and cabin.

Performance—first flight of the BuNavion occurred on July 1, 1941, at John F. Maier, at the controls for the maiden trip. Since then, about 40 in. of flight time has been put on the airplane, enough to establish some performance figures.

Take Climb, for instance. At a gross weight of 2,650 lb (about a 200 lb less than the expected because gross of 2,850 lb), the BuNavion gets up and away at 1,650 ft/min. Climb performance is equally good. At 75% power, the trim slowly along at a little more than 150 mph true airspeed.

Single-engine performance is also excellent. At a gross weight of 2,150 lb, the BuNavion will climb at 1,800 ft/min, reaching a pop to the dead engine.

The BuNa is scheduled for certification at a gross weight of 2,850 lb under Part 23 of the Civil Air Regulations. Certification is expected to be completed by early April.

And What? That's—Daring. Some old hands connected with this project have been asked about their future plans for the BuNavion. The simplicity and the low cost of the conversion in the material for well-stuffed and simple, equipped to other uses.

Speaking for the BuNa, Vice President C. J. Hadenberg said, "No discussion has been made as to the conversion of additional aircraft. This sort of aircraft development. However, we are now looking for an available source in the aviation field as to these specific ideas in relation to this project."

Clair is a consulting engineering firm. We are not manufacturers, nor do we contemplate entering the aviation field other than as consulting engineers. The project has yet shown a category of aircraft for which there has been need for quite some time, it is a unit which will be within reason.

—DAA

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► **Wind-Tunnel Investigation and Analysis of the Effects of Bad Plates on the Aerodynamic Characteristics of an Unmanned Wing (TN 2449)—By Donald E. Wiley.**

The wind plate is an aerodynamic body, generally which possesses some degree of lift. It has been shown also, however, in three or four years, primarily in a device for measuring the lift curve slope, and solving the induced drag of an aircraft wing. But in the past, the analysis of wind plate effects has given relatively low confidence for their effect on lift, drag, and extreme lift-drag ratio.

The results of the tests in this report are in general agreement with all previous investigations. They show that the end plates provided the basic wing with an increase in lift-drag ratio, a reduction in induced drag, and an increase in maximum lift coefficient.

Thus, some negligible conditions, in getting results due to the end plates. The new results indicate that the use of end plates can provide relatively large increases in lift-drag ratio, at higher lift coefficients, but end plates should not be relied upon to provide substantial increases in the maximum lift-drag ratio of the wing. The most beneficial effect on maximum lift-drag ratio is obtained when the wing aspect ratio is low and the ratio of wing profile-drag coefficient to end plate profile-drag coefficient is high.

The overall conclusion is that the use of end plates should not be of primary importance, with which it is desired to keep the wing span as small as possible.

► **Summary of Methods for Calculating Dynamic Lateral Stability and Response and for Estimating Lateral Stability Derivatives (TN 2469)—By John F. Campbell and Thomas G. McKinley.** Current design trends involving low aspect ratio, wingtip, and higher wing loadings have lead to considerable changes in lateral stability in many cases. It is becoming necessary for airplane designers to make dynamic stability calculations and in the design stage of airplane.

These calculations are difficult to perform since the designer has had no previous experience in this type of work. And unfortunately, most of the



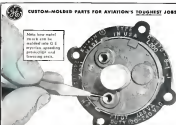
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Time was when a scene like this would have created quite a stir around an airport, but that was before the non-transport plane had proved it could earn its keep. Today, of course, such sights are common from coast to coast. Hundreds of corporate owners maintain one or more craft of this type for the routine use of executives and key personnel, because they find it pays off in higher efficiency, saving priceless time, cutting overall travel costs. High among the factors responsible for the trend is the performance of the engine which powers so many of these business aircraft. Product of specialized experience dating from 1902, Continental is far and away the first choice for utility planes—first choice for any use where dependability counts.



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published authors are not presented in a form specially suited to competition. It has also been difficult to estimate the stability derivatives which are required for these calculations.

The purpose of the present paper is to extend earlier methods of competition. It includes those which are of current interest to designers and methods of estimating the derivatives for configuration and flight conditions are now being considered. Simple and straightforward steps are presented for performing calculations of true histories of lateral motions, of the period and damping of these motions, and of the lateral stability boundaries. Existing methods for estimating stability derivatives are summarized and for some cases new and improved formulas are presented.

A bibliography of 128 references includes reports which present experimental data for estimating the derivatives. Flight at low subsonic speed is considered in detail, such as brief discussions and references are given for transonic and supersonic flight.

■ **Flight Investigation of the Effect of Transient Wing Response On Wing Strain of a Twin-engine Transport Aircraft in Rough Air** (TN 2424)-By H. C. Mackinnon and C. G. Shaw, Kelowna.

This paper reports results of a flight investigation made on a Martin 202 transport airplane. The purpose was to determine strains associated with the dynamic behavior of the wing during flight through rough air. Different wing load and two speed conditions were specified for flight at altitudes between 1,000 and 4,000 feet in climb and level.

The results of stress measurements on the airplane are enough to aid in wing fatigue studies.

■ **Wing stress per unit moment at equilibrium in gusts** was about 20% higher than those in slow roll-ups for all increasing positions and flight conditions.

■ **Dynamic component of wing bending stress** was primarily due to the contribution of the fundamental wing bending mode.

■ **Stress and strain rate bending stress** at each spanwise station showed the same relation to each other as gusts with a slow roll-up.

■ **Data on low shear stress** showed with scatter.

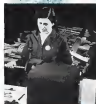
■ **Primary component of wing stress** for the gust conditions was primarily in an antisymmetric with respect to the airplane centerline.

■ **There was no significant variation of structural dynamic response** over the range of speed and weight conditions covered by the tests.

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Today, facing all military and commercial aircraft has been increasingly speeded time and equipment used where Carter-designed and engineered special-purpose valves are in service. For example, Carter under-wing fueling valves and nozzles, meeting all NATO specifications, assure fast and flawless transfer of fuel from storage to aircraft, eliminate spillage, wasted tanks, and powered handsets. Other typical Carter developments in this field are:

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1952 Pipers Fly Easier

A number of slight refinements to improve flying and handling characteristics make this year's line of Piper PA-20 Pacers and PA-22 Tri-Pacers fly easier off the line at take-off. By reflecting wing ribs, the new models carry higher gross weights and 10% more payload.

Basically, the planes are characterized by large, roomy, spacious interiors, providing improved visibility. The conventional special Pacer's landing gear is in a wider than before location. The most noticeable change has been installation of a more useful instrument panel designed to provide optimum placement of the increasing number of instruments used by light plane pilots, particularly in the blind flight group. Other cabin innovations include better air conditioning and sound proofing. 800's increase in fuel capacity.

The principal gain is the lowering of 1000 lb rated at 125 hp at 2400 rpm. Having a wooden fixed gear's pop in American air traffic control (ATIS) mode.

Prices on the PA-20 and PA-22, in new delivery this year's prices are in parentheses:

- PA-20 Model 125 standard \$5,175 (\$4,295) de luxe \$5,365 (\$4,485) 151 custom \$5,565 (\$4,685)
- PA-22 Model 135 standard new \$5,600 (\$4,740) de luxe \$5,740 (\$4,880) 151 custom \$5,940 (\$5,080)
- PA-22 Tri-Pacer Model 125 standard \$5,175 (\$4,295) de luxe \$5,365 (\$4,485) 151 custom \$5,565 (\$4,685)
- Model 135 Tri-Pacer standard \$5,600 (\$4,740) de luxe \$5,740 (\$4,880) 151 custom \$5,940 (\$5,080)

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Recent commission for pilots, and several and production officers, is being added to the AF force through the AF-100. The AF-100 commission is a new officer's degree, plus the AF-100, AF-101, AF-102, AF-103, AF-104, AF-105, AF-106, AF-107, AF-108, AF-109, AF-110, AF-111, AF-112, AF-113, AF-114, AF-115, AF-116, AF-117, AF-118, AF-119, AF-120, AF-121, AF-122, AF-123, AF-124, AF-125, AF-126, AF-127, AF-128, AF-129, AF-130, AF-131, AF-132, AF-133, AF-134, AF-135, AF-136, AF-137, AF-138, AF-139, AF-140, AF-141, AF-142, AF-143, AF-144, AF-145, AF-146, AF-147, AF-148, AF-149, AF-150, AF-151, AF-152, AF-153, AF-154, AF-155, AF-156, AF-157, AF-158, AF-159, AF-160, AF-161, AF-162, AF-163, AF-164, AF-165, AF-166, AF-167, AF-168, AF-169, AF-170, AF-171, AF-172, AF-173, AF-174, AF-175, AF-176, AF-177, AF-178, AF-179, AF-180, AF-181, AF-182, AF-183, AF-184, AF-185, AF-186, AF-187, AF-188, AF-189, AF-190, AF-191, AF-192, AF-193, AF-194, AF-195, AF-196, AF-197, AF-198, AF-199, AF-200, AF-201, AF-202, AF-203, AF-204, AF-205, AF-206, AF-207, AF-208, AF-209, AF-210, AF-211, AF-212, AF-213, AF-214, AF-215, AF-216, 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AF-967, AF-968, AF-969, AF-970, AF-971, AF-972, AF-973, AF-974, AF-975, AF-976, AF-977, AF-978, AF-979, AF-980, AF

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Questions should be addressed to the Director of Military Personnel Programs, First Air Force, Mitchell AFB, New York.

NAA Files AJ-2P

North American Aviation Inc.'s Columbus division has test flown the first AJP-27 computerized Navy photo access recovery bomber. Meanwhile, NAA's Los Angeles division has leased over 9,000 sq. ft. of factory space in Culver City, Calif., to handle work for its electro-mechanical department, which designs and develops automatic pilot, fuel control and navigation systems for aircraft and missiles.



STEEL SPOTWELDER posts several Buckmaster, Republic type, such as their aluminum alloy specimens consisting of their line, report. Cross-section is at top.

Spotwelder Speeds Republic Joining

The spotlight is being put on spot welding at Republic Aviation Corp. The increasingly important joining process is going to be extensively used in the production of the new Transjet model—the P-39.

Republic's greatest interest is spot-welding stems from the company's Military Capabilities Expansion program. Experimentation on the process began after World War II with a study of spotwelding feasibility for aluminum alloys thicker than .061 in. Minimum thickness that was commonly spot-welded during the war was .065, says Bussche.

► 40 and 100 per Minute—When the

Immediate benefits of the welding program are increased production, economy in labor shifts, and lower costs. The 50 operators who use high strength aluminum also compare with the 15 operators who use aluminum welding (see company machine—the General Electric robot—has a 22-weld-per-minute potential, but 15 is the production rate used at North American Aviation). On critical structures, not subject to secondary stresses, Republic has been welding up to 100 spots per minute.

► **Quality Good—**Republic says that the chief drawback in making it the multi-operation, one-hole drilling, countermilling, then reaming—as opposed



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Chad estimates of spotpacking—thin (1 mm) not more, uniform quality—has been depleted at Republic by intensive studies which reveal no differences. Wells involved in getting two 1-in thickness have estimated levels at 10,000 lb per spot, while wells in which 1-in thickness was joined to 1-in material have varied up under 10,000 lb per spot.



	Colella	Likierman	Mitchman
N	1		

During peak periods in the summer, 12 mice participated, with the males taking 364 minutes and the females taking 152.6 minutes. The functional check of

AV84804 4911C, March 18, 1951

THRUST & DRAG

New York University's College of Engineering is offering a new graduate course—"Introduction to Realist Philosophy"—to be taught by Alfred Mr.



AVENUE 44 WILK, March 21, 1911

development of humane air weapons. The Office of Science Research is sponsoring the conference with particular emphasis on graduate study in the fields of fluid mechanics, physics, chemistry, and mathematics. OSR will work with educational and industrial organizations to initiate and administer a broad research program, relevant to AF fields of interest, through contracts. Work has gone out that universities and research organizations who desire to compete with the AF in this area should contact the Office of Science Research, Air Research and Development Command, P.O. Box 1959, Dayton 3, Md.-DMA.

AVIONICS



THEN (15 run-ups per WA and five measurements per test engine).

NOW a battery of electronic instruments are needed to measure the additional data required for testing jet engines. Only part of equipment is shown.

Jet Instrumentation Turns to Avionics

Turbojet makers are assembling staffs of electronics specialists to tackle new measurement problems.

By Philip Klaus

Jet engine manufacturers are being forced into a brand new field—electronics—as they seek to solve the greatly increased measurement problems which they face in testing new jets.

Because most of the data they need can most easily be measured with electronic devices, and because these devices are seldom available commercially in the form or accuracy required, jet manufacturers are now assembling staffs of electronics experts.

Some of the measurement problems, such as obtaining data on combustion flow and combustion, are new to former piston-engine manufacturers. Other measurements pose a problem because jet testing demands higher accuracies. For example, an error of 1% in measuring rotor rpm could throw engine thrust off by 7%.

There are some of the considerations to be drawn from a paper on "Instrumentation for Aircraft Gas Turbine Development," given by R. E. Gordon and B. E. Miller during a recent Detroit meeting of the Society of Automotive Engineers. Gordon is a development engineer and Miller is an assistant project engineer, both with Pratt & Whitney Aircraft.

► **Instrumentation Needed**—In the engine designer faces to push thrust up and

specific fuel consumption down, he needs quantitative answers to lots of engineering questions.

► **Mechanical**—What is the output thrust? engine rpm? combustion chamber pressure? rotor rpm and vibration amplitude and frequency? temperature of the rotor and blades? and others.

► **Working Fluid**—What is the temperature and pressure distribution from inlet to outlet? and how much fuel is injected in the burner? the discharge gases?

► **Thrust and Rpm**—The key to accurate thrust measurement lies in the accurate measurement of rotor rpm. For P&W's engines, rotor rpm accuracy, based on 0.1%. This requires accurate control of the use of a 60-cps power reference. Power comparison charts to hold power line frequency "on the better" over short intervals of time. The answer, according to Gordon and Miller is to use the rotor complex, using lock or crystal-controlled frequency reference.

► **Rotor Run-Out**—When measuring the clearance between the engine rotor and its case the rotor itself becomes a part of a magnetic signal output. Rotor blades induce voltage reversely proportional to pitch clearance in electronic rotor pick-off mounted inside the core

If run ranges, for instance, rotor blades rotate into use, the problem gets more difficult, but Gordon and Miller think that a synchronous-type pick-off could then be used.

► **Simple Solution**—Some problems don't require a solution shaped in electronics. Take for example the problem of warning when there is danger of contact existing between rotor blades and the case. Very sensitive wires are attached to the inside of the case as they project a few thousands of an inch toward the rotor. If the blades come too close to the case, they scrape the wires, causing a warning light to flash before actual case/rotor contact occurs.

► **Vibration**—Measuring vibration with piezoelectric pick-offs is not a problem unless there is no rigid reference member to which the pick-off can be attached (for example, an oval shaped bearing on an oval free cap). But if it is mounted internally, the pick-off is exposed to 500F "cooling" air from the discharge end of the compressor, well beyond the pick-off's temperature limits. That requires a special insulated housing for the pick-off, with remote cooling air piped in.

The problem in measuring vibration in turbine and compressor blades is not in mounting the strain gages, according to Gordon and Miller, but is according to their signal output. A range of vibration frequencies up to 10,000 (Continued on p. 47)

Can You Identify this Registry?



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Argentina	AR	France	F	Nicaragua	NI
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Burma	XZ, XT	Indonesia	KT	Saudi Arabia	KE
Canada	CF	Italy	FI	Senegal	SE
Ceylon	CY	Japan	JA	Singapore	VR
China	CC	Korea	KT	Sri Lanka	SL
Colombia	CC	Laos	LT, LJ	Sudan	SD
Czechoslovakia	OK	Lebanon	LB	Switzerland	VR
Cuba	CC	Lithuania	LT	Taiwan	VR
Czechoslovakia	OK	Luxembourg	LL	Turkey	TC
Denmark	OT	Malaysia	MA, MB, MC	Union of South Africa	US, ZS, ZN
Dominican Republic	DI	Maldives	MD	United Kingdom	G, VR, VH
Egypt	ED	Malta	MT	United States	N, VR
El Salvador	ES	Marshall Islands	MI	USSR	CC
El Salvador	ES	Mexico	MX	Yugoslavia	YU
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Lebanon	LB	Taiwan	VR		
Lithuania	LT	Turkey	TC		
Luxembourg	LL	Union of South Africa	US, ZS, ZN		
Malaysia	MA, MB, MC	United Kingdom	G, VR, VH		
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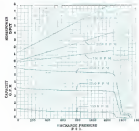


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(Continued from p. 42)
cycles, the resolution required for accurate maneuvering and the relatively long recording period necessary to catch the full engine acceleration, provide strong an indication. But if the data is recorded on a magnetic tape recorder, and played back at reduced speeds, a conventional oscillograph can handle the proportionately lower level of its quantities.

► **Rates**—Temperature-Turbine blade creep and leakage studies require data on blade and disc temperatures which can be obtained using thermocouples. The problem here is to transfer the small thermocouple signal voltages from the high-speed order to stationary recording devices without serious loss of signal strength. To prevent signal loss, P&WA has developed their own slip ring transfer unit which uses shielded and shielded cables and slip rings, the same material used in the thermocouples and leads.

► **Burner Temperature**—When temperatures get above the usable range of thermocouples, Gorton and Miller suggest using a two-stage probe. The main flow through the probe can be determined by measuring pressures and temperatures at the second orifice, hence the temperature at the first orifice can be obtained by calculation from measurement of its pressure.

► **Automatic Control**—To measure temperature and pressure throughout an engine, P&WA is using an automatic remote-controlled probe positioner. The device, which they developed, uses a self-balancing servo system to align the pressure probe for zero differential pressure along its axis, then automatically establishing flow direction.

With hundreds of measurements to be recorded at each step in a engine test, P&WA has developed an automatic plotting machine called the "Plotmaster."

► **The Plotmaster**—The new device plots flow angle, total temperature, and total pressure for any particular engine stage as a function of the circumferential position of the measuring probe. Each of the three variables is plotted on a separate recorder. Each recorder's servo arm then is servo-motored along the "Y-axis" in accordance with the magnitude of flow angle, temperature, or pressure. Another servo motor drives the recorder chart paper proportional to the circumferential position of the probe arm. Thus one point on the chart's "X-axis" represents a particular radial around the periphery of the engine for the particular flow angle, temperature, or pressure recorded.

The depth of the probe (radial) movement relative to engine axis (axial) is manually set by remote control.

► **Fuel Flow—Conventional fuel-flow**

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indicator as satisfactory for steady state conditions, but they have too much inertia to measure rapidly changing conditions such as might be encountered when a fuel/oxidizer ratio becomes unstable. Gorton and Miller suggest the possible use of direct detection properties of a liquid flowing through a magnetic field to make transient flow measurements.

► **Beamer Studies**—The method of extracting the gas sample can be a serious source of error in analyzing fuel/air ratios. Unless the sample is obtained from an upstream sampling tube, with the rate adjusted to equal free-stream velocity, the authors say that the sample may not represent actual conditions in the burner.

► **Note of Caution**—Gorton and Miller stressed that instrumentation designers need a good grounding in physics, thermodynamics, sound, vibration, and portable electronics. Their caution that unless instrumentation engineers fully understand the limitations of their instruments and measuring techniques, they not only can easily lead to false conclusions. Recognizing that aging instruments are relatively easy to fix, the authors emphasize the need for frequent calibration of laboratory and test instruments to basic standards.

Measuring Report

A new, fast, portable technique to speed measurement of fuel rate during transient operation and for kinetic rate comparisons of burning in model engines in electronic apparatus has been developed by Naval Research's John L. Lachance. It is described in a report PB 193-546. A New Instrument for Rapid Measurement of Gas Flow in Turbulent Combustion. Price \$1.00; Office of Tech. Services, Dept. of Commerce, Washington 25 D C.



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PRODUCTION

Why Production Lags in Britain

Shortages in skilled labor and key machine tools hold up efforts to build substantial air power, aid NATO.

(McGraw-Hill World News)

London—Last year it took 14 British aircraft makers 15 to 17 months to deliver an order for an aircraft already in production. Now it takes 18 to 26 months.

Last year orders for new types earned delivery dates from 22 months to two years. Now it takes 23 months to 29 months.

The evidence, given by the Ministry of Supply, to Parliament's "supply" committee on November 14, says the delay is not just made public, gives the dimensions of Britain's current production bottlenecks. With it goes a general 10% price increase in the cost of all replacement items. Last year's supplier (probably a Canadian) cost \$217,930; this year's supplier needs \$240,000.

Shortages—Evidence supplied by the committee of the Society of British Aircraft Constructors showed that the old machine-labor, materials and tools were still plaguing the industry. BMC's evidence, supported by the Ministry of Labor, pointed up the fact that the shortage of skilled labor could not be filled by transfers from other industries. BMC's record that a large number of

skilled labor and control in test control evidence.

BMC's machinery didn't agree on the effects of materials shortages. "There and production was being held up, but it was 10% short. Short was the worst case, then."

Some BMC witnesses reported that the presence of American tanks in Germany was being held up, but it was not a problem for cases where progress had been made. "Others thought the tool situation all right as to what to do to the material of work, going on due to labor and materials shortages. The tool problem looks like one of just horrible caused by lack of a few key tools—mainly for the American program."

For New Plans—The hearings of the committee, while held over a month ago, still take a lot of work out of the government. It takes this week that over a third of the 6,000 aircraft to be flying by 1950 is in the end of this year will be British. It seems likely that the figure includes, large segments of the RAF, based in the U.K., as well as the RAF's 2nd Tactical Air Force in the continent.

Foreign Ministry Labor and in Germany recently that he expected would

enable "blowing" of RAF and other European air forces in the near future. As Minister Lord de L'Isle and Dudley last week that the 2nd Tactical Air Force will get the largest expansion in the RAF this year. Together with the Messers and Vespene now flying and being supplied to Belgium, Czech and French air forces, the British will still have more than 1,300 planes in the NATO air force this year. But the production outlook indicates that a good many of these planes already exist.

Solar Gets Big

New Contracts

Solar Aircraft Co., San Diego, has stepped into the large Westinghouse 140 engine program in a big way. Solar has gotten a \$15-million order of 100 units from Science Research Mission division of Ford Motor Co. for facilities testing and production of afterburners, combustion chambers and other hot parts for the 14,000 lb thrust turbojet.

It is explained that this largest turbojet order ever received by Solar is made for facilities and testing, including further large orders in the offing on this project alone. The company will handle the work at its big new Wakefield facility in Des Moines, Iowa.

Other recent Solar successes in picking up important new contracts include a large order from Allied Chemical for test portions of the 5,700-shp. PGW T4 turboprop engine. AEC is one of Pratt & Whitney's prime sources for T4 components. Still other orders have been received from Allison, USAF, USN, General Electric and Packard Motor Co.

In all, this recent business brings Solar's backlog to an estimate peak of \$27,240,000—not counting Allison's letter of intent—up from \$10 million last year's \$40 million.

The West Coast producer is also having its 24th anniversary this year.

Expands Turbojet

Equipment Business

For some the vastly expanding aircraft turbine accessory market, General Electric has set up a new operation—the Accusync Turbine Unit—concentrated upon the phase of the jet engine and aircraft field.

Named head of the new branch is J. P. Barnes, Jr., formerly sales manager of GE's Paris, France, operations and at one time coordinator of aircraft turbine facilities at Lorain, Ohio.

Accessory Turbine will be concerned with development and production of

turbopropellers and propellers, jet engine starters, turbine-driven fuel pumps, and air turbine driven air starters and hydraulic pumps. Head quarters will be at GE's River Works plant, Lynn.

Convair Supervisors

Going to College

Representatives at General Dynamics Vultee Aircraft Corp.'s Ft. Worth design are going to college.

Convair is management will be offered these students at Texas Christian University. Sponsoring group is Convair's Management Club. Initially, two courses will be given—human relations in industry, and production control—but eventually the studies will be expanded to include a full curriculum leading to a degree in management.

Each semester, the two highest ranking students will be nominated for their courses, the money coming from a scholarship fund created by the Management Club.

This is the second university training scheme inaugurated by Convair in the past six months. Earlier, the division began operating an engineering training program, in cooperation with Southern Methodist University, on the undergraduate and graduate levels.

PRODUCTION BRIEFING

Acropoly Corp., Indiana, Mich., has furnished arrangements with the South-Southwest distributor, Acropoly Sales and Engineering, Inc., Ft. Worth, Tex., and will handle sales and service activities directly with customers in that region. Reimbursement program and changing economic conditions are given in column for new plans.

Airtex, Inc., Linden, N. J., has acquired a new plant with 23,000 sq. ft. of manufacturing space in Linden. General will be looking for a lot of 15,000 sq. ft. addition to the new building.

The Austin Co., New York, has established a new headquarters in its Special Devices division in the East of New York, Authority Building at 70 North Ave., New York 17. Firm makes electronic computers, control systems and similar devices.

Rockman & Whitney, Inc., San Carlos, Calif., instrument engineering concern, has established a General Motors Products division.

Boeing Airplane Co., Seattle, has awarded a \$5,215,164 contract for con-



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Lexed Circuit Selector is a product of the LEXED Company, which is widely used for remote control of complex circuits to ensure top product performance. They are powered by dependable LEXED Battery Selectors, available with various types of mountings. Will control practically any number of circuits... and can be custom-engineered to fit your product. Let Lexed Engineers work with you to produce an efficient Lexed Circuit Selector or Stopping Relay for your product. Write today for complete information.

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J348 ROLL DOWN KC LINE

Westinghouse J34 and other military engines are seen as a portion of final assembly line at the company's huge 55-acre Kansas City assembly plant, built during World War II. These engines are getting

final touch-ups to delivery to Navy and Air Force. KC plant concentrates on volume production of aircraft-approved jets, engineering, development and prototype is handled in St. Louis, Mo.



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EQUIPMENT



CLOSE HANDS between the cockpit pilot and mechanics is one aspect of

Colonial's 'Personal' Path to Safety

The men get to know each plane's peculiarities because the same shop crew always works on the same ships.

By George L. Christman

North 22 connects years of school and experience without a fatal accident or serious repair. So passengers or crew members in the cockpit, armed wing up, in Colonial Airline.

A glance at Colonial's impressive safety history shows that the airline in its first 22 years, flew 418,692,855 passenger miles, completed 522,294 landings and takeoffs. It carried over 1,487,327 passengers safely over its routes of 11,882 miles, stretching from Washington National Airport and Lufkinville Field in the U.S. to Montreal and Ottawa in Canada. (In addition, Colonial has a southeast link to Bermuda, added after the war.)

Personal Touches—T. H. Vole, director of maintenance and overhaul in Colonial's V.I. Aircraft Field Inc., sets a single factor contributing to Colonial's unblemished record is the "personalized interest and control" he maintains here with the airline's fleet of eight DC-4's and four DC-3's.

Because of Colonial's schedules and route structure, no aircraft is ever flown more than 48 hours. So the "fliers" know each plane's idiosyncrasies and give each the personal touch treatment necessary for flawless service since. The same group of men always work on the same planes so they become completely familiar with each ship.

Cockpit Shop Liaison—Another key man for the airline's safety record, ac-

cording to Vole is the close liaison he creates between the cockpit and the mechanics in the shop. If a pilot has an unusual symptom, he tells his staff only to trim it up, but to go to the maintenance, fuselage and discuss it with him personally.

In the same talks, if a liaison does not fully understand a symptom, and tries up by a pilot, he calls the pilot and asks for a fuller or clearer description of the trouble. Such close liaison can not help but prevent better maintained aircraft. Vole feels. And it is good for employee morale.

A procedure that helps to concert the plane's maintenance is the direct radio contact pilots often have with the maintenance department in case trouble develops while the craft is airborne and the pilot is unable to spot corrective measures in time.

An Vole puts it: "They feel less



EMERGENCY UNIT on Colonial DC-4 was in spread down ready to activate.

about their when they get into that ship." He cites as example of a recent Colonial DC-4, under charter to East Air. Mr. Lutes, whose own gear would not come down when the ship came in for a landing. The pilot got in contact with both maintenance and operations personnel at New York. Quick calculation showed that the pilot could bring the plane in on main gear and tail with the load he was carrying. He was told how many passengers to move to the rear of the plane. The captain was able to make a perfect landing without injury to passengers or crew and with negligible damage to the plane.

Around the Shop—Colonial has developed for its DC-4s a long-needed emergency exit that opens from the outside as well as from inside. The two families are on a constant shift, maintained by Colonial. The modifications can be performed, each little and could conceivably be instrumental in saving a plane load of passengers. Colonial has painted red lines around the outside of the exit, an emergency evacuation of situation at the handle, and in large red letters, the word "Push."

Colonial has installed the outside handles on its DC-4's, it is the process of remodeling its entire fleet. The company's DC-3s will get the same treatment. The exterior lighting made "Push" become the emergency door open out on the DC-4.

Quick-Hook-Spools—For airplanes, wings in such places down going on an scheduled "flight" when not down during strong windstorms are nothing new on the business of aviation. But this has gradually fallen into disuse as planes have gotten bigger and longer. The DC-3, however, is light enough to be hoisted up by hurricane winds. So Colonial pilot spools on the ship wings in the face of heavy blasts. Vole says on one ship, one of his own company's DC-3s was kept from the ground by use of the spooler until time takes a few moments although the wind was blowing so hard the spooler was unworkable.

Gas Gauge—Colonial, along with most airlines, is unhappy about the increase of fuel control in aviation fuel according to various officials. One of the results of increased fuel is a reduction in spooler play time. Officials say spooler has dropped from 375 lb. minimum, 200 lb. to 200 lb. maximum, 150 lb. winter. And airlines begin to feel more rapidly.

Since Wash-Colonial has several projects going in its shop. They include:

- Replacing the top on cylinders of the B-2000-11 engine with —11 cylinders having the same type barrel. Better cooling, and increased piston life are expected.
- Change from hand-applied control

which whenever possible, to image-type. The film outfeed runs in cable 1 DC-4 by over 60 ft.

• **Head operated, dry cell powered**—Flash lights are attached to the camera DC-4s in cans, an emergency, such as detaching, breaks out the ship's main electrical system. The lights illuminate both ends of the main cabin and the film storage compartment.

• **Full and drain method** is being used to strip film tanks on a DC-4, extremely undergoing a \$1,000 by inspection at Colonel's hangar Winkler's #2104 tank descent in long run with efficient results, up. C-45 specimens (discovering) sunlight is a safety precaution taken by safety-conscious Colonel. The last 12 feet of wire of the cable snap-proof inside lights used to reject inside of the tank is covered with heavy rubber base. This gives positive assurance against cutting through the wire's insulation on sharp edges of the snap.

• **Short (cable-and) has (power) fail**—Refused. Properly, the correct one, piloting, the forward face of its propeller.

Airline officials say, the crew is keeping its blades clean and neat looking. On DC-4s, the pilots report that they can tell that the leading edge is done by rubberside, cut on the light, polished blades—a most feat.

• **DC-4 Changes**—An experiment is being tried on the DC-4 currently under going overhaul. The physical damage is being removed and replaced with new paper and sponge rubber-lined (damaged) bearing material. Weight saving of 250-300 lb. is expected.

At the same time, various steel floor coverings are being installed in the pilot and tail to make control.

Cabin heater controls are being moved from the forward baggage area to a panel above the cockpit's head so that he may have complete control at all times without the need for manually operated fuel shut-off valves are being installed in close to the heat as is possible. These panels slanting the better show in case of failure of the electrically controlled. One cable is in the cockpit's right foot, the other in the door leading to the cabin.

DC-4s carry Life, oxygen, equipment. "Victory Girl" emergency radio transmitter are mounted on Colonel's life raft (which broadcast on dual frequencies—900 kc and 8250 kc). Every gear cable are put out on each frequency, alternative.

Two of each three life rafts carried on the DC-4s are also equipped with portable radio transmitters and receivers. The VHF band takes transmit on 121.5 mc and has an average range of 15-20 mi. Sixty minutes 144 mc long is 14 on the Wavelength 2.11 ft, plus another 2.5 ft for a new Midland emergency-type battery. The battery gives the act a life of about 25 hr.



SHELL REFUELLER will tank up the 4-Bristol Comet in under a half hour.

New Tanker Fleet to Service Jets

Shell Petroleum Co., Ltd., will spot 60 of its Dorset tankers along BOAC's routes to speed Comet refueling.

With the Comet expected in May to go into scheduled service on British Overseas Airways trunk routes, Shell Petroleum Co., Ltd., in contact with the carrier, is taking delivery of 60 refueling tankers specially tailored to meet rapid servicing needs of the speed jet aircraft.

Built in collaboration with Shell by Thompson Bros Ltd. Britain, the tankers are being speeded in mass scheduling points along BOAC's routes to Singapore and Johannesburg, which point-to-point in the company's expansion route with the Comet.

With a good English name this. The jet, the tank carries 1,600 U S gal. delivery it at a top rate of 250 gal. through a single line fitted for underwing refueling. Tank indicates two of these units under normal conditions can tank up the Comet in well under a

half hour, including time taken for emptying the lines to the plane. Each Seven 1 Comet has a capacity of 7,250 U S gal., while that for later Series 2 is being topped to about 8,400 U S gal. This compares to about 7,000 gal. carried by the Boeing Stratocruiser.

• **Fast Flow—Capacity** of the Dorset is about average, 3,500 gal. compared to 1,800 to around 5,000 gal. carried in other tankers. But its delivery rate of 250 gpm., compared to a maximum 200 gpm. for commercial tankers in general and less, is high. (While it can deliver fuel at a faster rate to a single point, some tankers recently introduced here, as single units, deliver more fuel they carry two lines, delivering to further as much as 900 gpm. Two Dorsets can exceed that by only 100 gpm.)

Still, the new jet service's high single-line delivery rate at least can be offset by the full in underway refueling. "Flow back" and extensive hosework from the rapid delivery in overwing delivery often requires that hose output be reduced well before its maximum to prevent such occurrences.

• **U. S. System—While** already enters service used by the U. S. Air Force, the only commercial plans covering underway refueling as standard equipment are Martin 2-0 24s and 4-0s operated by Trans World Airlines, Eastern Airlines 4-0s and formerly by Northwest Airlines 2-0 2s now leased out.

Norfolk also involves the system in its Stratocruiser, although it is not standard in this craft. Some advantages noted for underway refueling are faster permissible delivery rates, improved accessibility making for faster loading.



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CONVAIR B-36D BOMBERS

WEIGHT LOSSER BOMBS, the Conair B-36D, has a 13,000 mile range and a cooling of over 45,000 feet.

It uses a Clifford oil cooler to get rid of the heat generated in the combustion process which runs the engine in the 400 cycle operation. The oil cooler is essential to the proper operation of the oil under the varying conditions of takeoff and flight and prevents the oil from becoming too hot and losing weight before.

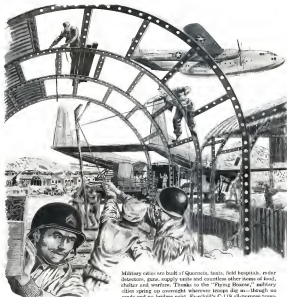
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FUEL CONTROL OF Control tank is read directly off lowered drop stick.



UNDERWING REFUELING points on the jet are easily reached from ground.

and less chance of damaging wings. But while underwing refueling is growing in favor, the Dard's designers didn't forget that most aircraft around still are the overwing type. The aircraft is built to handle both systems. Fuel is supplied by a single, high capacity overwing pump driven by a takeoff on the vehicle's engine. The tank can draw fuel from an outside source to its pump or its own supply, with containers to deliver to the plane, and a one pump is remote to all feed or defuel plane. All controls and gauges are conveniently combined on a single panel, simplifying the operator's task.

► **Control System**—The Control is installed at two points, through standard SBAE Lockheed Avery cone-type couplings, located just outboard of each wheel well and just above the first of the ground. Fuel is directed to fuel tanks, a main one in the center section under

the fuselage, two outboard and two outboard wing tanks. Each is equipped with fuel quantity cut-off switches that automatically close the refueling valve when fuel reaches a certain level. If the refueling tank and tanks overflow, a three off refuel valve serves as backup. In each wheel well is a control panel containing fuel tank fuel control gauges, and warning lights, and three push-button switches marked "Refuel," "Off," and "Off Load." A master refuel switch is located under the belly of the plane.

The refueling switches are held open manually until the third level is high enough to activate the first operator cut

off switches. The point is about 100 gal short of full capacity, then the refueling control on, control switches go off and fuel refueling valve close. To top off tanks, pumping is reduced to 10 gpm, and control switches are manually held to "Refuel" until the ref lights come on again. When tanks show 1 hour to be filled to normal levels, supply can be cut off any time by manually overriding the control switches.

While fuel quantity can be read off gauges at the wheel wells, a direct check is provided by a "dropstick." That is a sliding tube fixed to the base of each tank which can be pulled out. As the tube is withdrawn and the open top

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comes down to the level of the fuel in the tank, the fuel flows into the tube and drops from the bottom end. By means of a graduated scale on the stick, the amount of its withdrawal when that indicator appears gives a direct reading of contents.



Sponge Sealer

Sponge rubber weather stopping and gasket material with a patented internal shell more reinforcement is gaining favor in aviation circles.

Goetzman Aircraft Engineering Corp. engineers state that the material, named Inseal-Bond, has given excellent results in the last four years in Goetzman applications where it is used to seal bulkhead doors.

Durable features constructed by Goetzman are:

- **Hermetic sealing** of the sponge rubber core is a double Neoprene cover or "skin." Result is that when Inseal-Bond is compressed, air bubbles in the rubber honeycombs are trapped in the airtight seal and cannot escape. When pressure on the seal is relieved, air seeps back into the expanded cells, counterbalancing the tendency of rubber to set in the compressed shape. Life of the seal is considerably prolonged.

- **High-tensile strength** sponge steel wire, looping through both flange and rubber bond, gives the seal resilient strength and also contributes materially to long life.

- **Neoprene skin** is impervious to gas, oil and other fluids normally used in and around the aircraft.

- **How It Is Made**—The two sponge rubber bond is molded into a new fabric cloth frame. The sponge rubber is cast onto the wire, the rubber flowing through the wire loops which act as continuous anchors. A vulcanized bond is also obtained between the sponge rubber and wire cloth.

The seal is covered with rubber concentric rings with rubber latex. The standard product is covered with Neoprene and is available in several colors and with several thicknesses of latex deposits.

A heavy-duty version of the product uses a thick latex pocket vulcanized to the core.

The size of the flange can be any material specified by the purchaser—

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paper, film, nylon, etc. The semiconductor device is made to flexible enough to conform to the most irregular surface, and can be bent through 180 deg. arc without reversal. The lead can be set at any desirable angle to the diaphragm.

The slight amount of rigidity has aided by wire elements is used to speed construction, and with the tough Nio core coating gives great shock-life. The probe is reported to be competitive with other surface stripping and gauging materials.

Surface semiconductor using lead foil, according to the writer, are Ciba, Inc., Martin and Partridge, in addition to German.

Exclusive agent is Donald H. Harver (Lead foil division, Rappaport Films, Inc., 528 Fifth Ave., New York, N. Y.

B-36 Panel Lights

Individual "tag" lighting, which gives general lighting of the entire panel is being used to illuminate instruments in the B-36, General Electric reports.

Two beta per instrument are used GE has adapted its No. 327 sensitive bulb for the job. These have a diam. of 1 in. and a length of 1 in. They are mounted in red plastic holders at the top of each instrument and produce a red light through filter. This has been found best for dark adaptation of the eyes.



HYDRAULIC POWER-PACK

This self-contained hydraulic power pack provides "continuous efficiency with minimum weight," according to the manufacturer, Dorey Equipment Ltd., of Chichester, Sussex, England. The unit illustrated will be able to operate a wide variety of hydraulic machinery and is supplied for American B-36's giant Presses being built. The American unit consists of a 5-hp. variable speed electric motor driving a radial pump of 50% efficiency at maximum speed and pressure. Delivery is 6.45 gal. per 1,000 rpm. at zero pressure. Working pressures are 4,000-5,000 psi., max. pressure is 7,000 psi. Normal speed range is 4,750-6,250 rpm. and max. rpm. is 7,000 under no load conditions. Dimensions are 29 1/2 in. x 18 1/2 in. x 12 in. Life testing and re-reflectance tests are conducted by automatic control of the motor through a pressure switch.



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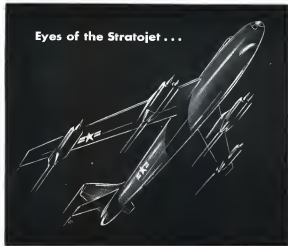
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NEW AVIATION PRODUCTS



Fuel Switch

A fuel primer differential switch meeting Mustang Aircraft, Inc. approval has been placed on the equipment master by Missile Aircraft Engineering Co.

Already in production, the switch conforms to Mustang drawing 23-5210 and is built in accordance with applicable AN specifications, says C. B. Lewis, chief engineer and pattern in Missile Aircraft.

The switch is suitable for operation at any pressure up to 40 psi. Pressure drop, giving 24 psi differential across the switch to activate an electrical circuit. At the opposite end of the switch, when pressure rises for a differential of 18 psi, switch also closes into open line. The part is designed for use with 25 v. d. c. aircraft electrical systems.

Missile Aircraft Engineering Co., 132 E. Orange Grove Ave., Burbank, Calif.

replied both is 25 in. and 10 ft. lengths, the barrel only is 10 ft. length. A 30-ft. tap, costs \$9.95; price on the 36 in. taps is \$4.85.

Electric Corp., 7114 Laurel Court Blvd., N. Hollywood, Calif.

Drill for Plastics

A new biological drill for working plastic materials has been developed by Worthington Electric Corp., Pitts-
burgh.

The drill has a straight round shaft rather than a square one, found in conventional types. It will penetrate a thick plastic section like a hot knife passing through butter, which reduces drill time, by not slowing to put overburdening. Worthington claims: The new part not only is faster but lasts longer, says the company.

Shaft of the new drill is only 40% the diameter of the drill tip. To prevent better chip flow and reduce friction the drill tip is notched so that chips are chopped into small particles.

Coating for Runways

A new plasticized synthetic rubber and tar blend to protect airport runways and taxi strips from jet fuel spillage has been announced by the Napier Chemical division of the United States Rubber Co.

The material, called "Seal-Aero Seal," is scheduled to be tested this month along with similar products at Hunter AFB, Savannah, Ga., according to the firm. The product will be applied to a 500-ft. section of runway and a taxi strip.

U. S. Rubber believes the material is preventing deterioration of runways from kerosene fuel spilled by jet planes. Kerosene has a tendency to dissolve asphalt concrete pavements. Fuel spillage, once topped off tanks, generally occurs on the parking stands, taxi strips and the first 500 ft. of runway, the company points out.

Before application, Seal-Aero Seal first is mixed with selected tar cement in the hot melt phase, then shipped to the site in drums, tank cars, etc., where it is mixed with aggregate in a pugmill and then placed.

To provide protection for existing asphalt concrete pavements, a coating of 1 to 1 1/2 in. of the blend is laid with aggregate paving equipment, then rolled and compacted. Or in new construction, the material can be combined continuously with aggregate concrete.

The blend is said to be unaffected

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AIR TRANSPORT

Higher Fares Needed Now, Say Airlines

- \$1-a-ticket hike, end to roundtrip rebate asked.
- But CAB rate men see no need for increase now.

In the next 15 days a majority of the five main Civil Aeronautics Board will decide whether or not to allow the airlines to hike air fares about 6%, effective Apr. 16 for some lines, Apr. 27 for others. The price increase proposed by most of the U.S. domestic trunk airlines is a straight 5 1/2¢ raise on one-way fares and elimination of the traditional 5% discount on roundtrips.

The Board's top staff officials are not advocating imposition of the proposed fare increases at least until a compelling need for the raise is proved by the airlines.

Because of the importance of the decision, *American Weekly* reports here detailed arguments of American Eastern and United—the last three have to wait CAB their "particulars" advocating higher fares—and the counter arguments given by CAB's intervening officials.

Speaking for Eastern—American Eastern and United—the last three have to wait CAB their "particulars" advocating higher fares—and the counter arguments given by CAB's intervening officials.

Highlights of American's reason to CAB:

- Low fares risk, costly. Fares are far lower today than they were in 1940, in terms of purchasing power. But "such an adjustment was not without risks and cost," American says.

For the three years 1946-48, domestic trunk lines' operating loss totaled \$30 million. For the years 1949-51 the return on investment of the Big Four lines, after taxes, was only 49%. American was 47%.

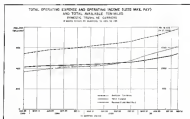
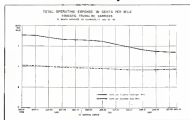
Two lines "no significant reason to reduce it against labor, economic shocks."

• Pricing not CAB's job. "The Board cannot make transportation decisions."

Where the question is only one of sound business judgment, the decision should be left up to private management, American says.

• Discount on CAB return. "The elimination of a roundtrip discount is a minor adjustment of no possible concern to the regulatory agency."

"The freedom of management to provide or withhold such discounts, and so



very there in amounts when they are given, is illustrated by the diversity found in the long-splintered semi-transportation field," adds American. The company says the discount is "a premonition of the future, given or withheld, as the situation's 'truth' indicates."

American estimates the elimination of the discount would have added \$3, 146,025 to revenues last year if one could assume that the discount did not influence anybody to buy or hold onto a roundtrip by air. The operating contribution to American in including round-trip is about \$209,000.

"As a premonition device, the 5% discount is so small that its value is nil," says A.A. Ryan.

American further argues that now, with business demand good, is the best time to put through the discount elimination—rather than waiting until people are more cost-conscious.

American argues that the air, a possible legal question on the discount, is raised within the administration of the Interstate Commerce Commission, has been discontinued. Elimination of a uniform 5% discount doesn't raise the problem, says A.A.

• Dollar raise reasonable. American as-

SHORTLINES

► **McLaren Aircraft** is seeking CAA Maintenance Check Riders to be deployed throughout the country for various aircraft types. The company is currently seeking individuals with a minimum of 10 years experience in aircraft maintenance and a valid CAA license. The company is located in the San Francisco area.

► **Air France** plans to start a new ship on 11 March. The ship is to be used for the transport of passengers and cargo. The ship is to be used for the transport of passengers and cargo. The ship is to be used for the transport of passengers and cargo.

► **British European Airways** want to start a new ship on 11 March. The ship is to be used for the transport of passengers and cargo. The ship is to be used for the transport of passengers and cargo. The ship is to be used for the transport of passengers and cargo.

► **Capital Airlines** plans to start a new ship on 11 March. The ship is to be used for the transport of passengers and cargo. The ship is to be used for the transport of passengers and cargo. The ship is to be used for the transport of passengers and cargo.

► **Canadian Air Transport** Board and CAA have increased the rate required for charter flights. The rate is to be used for the transport of passengers and cargo. The rate is to be used for the transport of passengers and cargo. The rate is to be used for the transport of passengers and cargo.

► **Civil Aeronautics Board** is acting on a petition for reconsideration. The petition is to be used for the transport of passengers and cargo. The petition is to be used for the transport of passengers and cargo. The petition is to be used for the transport of passengers and cargo.

► **Delta Air Lines** filed a suit with the CAA. The suit is to be used for the transport of passengers and cargo. The suit is to be used for the transport of passengers and cargo. The suit is to be used for the transport of passengers and cargo.

► **Douglas Aircraft** has received a contract for the transport of passengers and cargo. The contract is to be used for the transport of passengers and cargo. The contract is to be used for the transport of passengers and cargo.

► **Eastern Air Lines** is considering the purchase of a new DC-7C. The aircraft is to be used for the transport of passengers and cargo. The aircraft is to be used for the transport of passengers and cargo. The aircraft is to be used for the transport of passengers and cargo.

► **Helicopter Air Service** has received a contract for the transport of passengers and cargo. The contract is to be used for the transport of passengers and cargo. The contract is to be used for the transport of passengers and cargo.

► **International Airlines** is seeking CAA Maintenance Check Riders to be deployed throughout the country for various aircraft types. The company is currently seeking individuals with a minimum of 10 years experience in aircraft maintenance and a valid CAA license. The company is located in the San Francisco area.

► **Lake Central Airlines** will get 500,000 new, improved mail bags for the period Nov. 5, 1949 to Dec. 31, 1951. The bags are to be used for the transport of mail. The bags are to be used for the transport of mail. The bags are to be used for the transport of mail.

► **Medco and U. S.** have cut some red tape for border crossings. The red tape is to be used for the transport of passengers and cargo. The red tape is to be used for the transport of passengers and cargo. The red tape is to be used for the transport of passengers and cargo.

► **National Air Transport** Board and CAA have increased the rate required for charter flights. The rate is to be used for the transport of passengers and cargo. The rate is to be used for the transport of passengers and cargo. The rate is to be used for the transport of passengers and cargo.

► **National Airlines** has received a contract for the transport of passengers and cargo. The contract is to be used for the transport of passengers and cargo. The contract is to be used for the transport of passengers and cargo.

► **Pan American World Airways** has received a contract for the transport of passengers and cargo. The contract is to be used for the transport of passengers and cargo. The contract is to be used for the transport of passengers and cargo.

► **Post American World Airways** has received a contract for the transport of passengers and cargo. The contract is to be used for the transport of passengers and cargo. The contract is to be used for the transport of passengers and cargo.

► **Reynolds Aircraft** has received a contract for the transport of passengers and cargo. The contract is to be used for the transport of passengers and cargo. The contract is to be used for the transport of passengers and cargo.

► **Republic Airlines** has received a contract for the transport of passengers and cargo. The contract is to be used for the transport of passengers and cargo. The contract is to be used for the transport of passengers and cargo.

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UNEMPLOYED RATE

10.1% in the aircraft industry

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EDITORIAL

(Continued from p. 85)

three in each of the seven domestic regions. The incumbents of these positions are given the responsibility and authority for planning and implementing the deployment work program in all areas of Aviation Safety.

On October 31, 1951, the Director of Aviation Safety transmitted a letter to all individual Aviation Safety personnel which, among other things, described the selection process which had been devised upon. This consisted of four steps, as parts

1. Each employee concerned to submit a Standard Government Form 57 outlining his experience, education and security status, in conjunction with his past performance ratings and personnel aptitude report submitted by his superior—all to be used by the National Personnel Plan formula in effect for the past year and years.

2. A group interview in the group of moving personnel and leadership characteristics in a group situation.

3. An individual interview to further ascertain personal characteristics.

4. A written test, of the multiple-choice type dealing with aviation subject matter.

In this letter, the director requested Aviation Safety personnel of grade GS-12 and above to participate in the remaining process and, as a result, a total of 519 employees were evaluated during the process, which began on October 29, 1951 and was completed January 11, 1952.

After each person was interviewed, the results of his preliminary tests were recorded after agreement by all three members of the examining panel and forwarded to and to the Personnel Office of the Civil Aeronautics Administration in Washington. Upon completion of all interviews, the Personnel Office then had completed a final composite worksheet for each individual, and awarded ratings, listing in numerical rating order all the candidates who met the technical qualifications which had been established for each separate position. The individual questionnaires and job descriptions for each position were established in accordance with needed procedures as required by the Civil Service Commission, the Department of Commerce, and the CAA, and assured that each person whose name appeared on the register was competent from a technical, professional and experience standpoint for that particular position. A copy of these standards was mailed to all personnel prior to the start of the screening process.

The Deputy Administrator of Civil Aeronautics, the Personnel Office, and the Director of Aviation Safety, after detailed consideration, determined that the selection procedure policy would be to select, from the upper 25% of the register established for these positions, the Washington field and branch chiefs and the regional division chiefs, and to select the regional district chiefs from the upper 50% of the register established for these positions. It was also decided at the same time that the selections would be made in a group made up of all of the seven domestic regional administrations, the Deputy Administrator of Civil Aeronautics and the Director and Deputy Director of the Office of

Aviation Safety. This group met in Washington on January 27-28, 1952, for the purpose of selecting individuals for each of the aforementioned positions.

Also, as a part of the removal process, in each of the seven domestic regions there were four senior staff positions to be filled. Because incumbents of these positions are usually responsible for TECHNICAL decisions on a day-to-day basis, it was felt that experience of high standards of experience and superior qualifications was not so essential as in the upper echelon positions. Therefore, regional administrators were requested the latitude of selecting any name from the appropriate register.

From this you should see that one select part of the reorganization which has not been brought out in your editorial is the fact that the changes in organization structure pertained only to the Washington and regional headquarters offices, and had no effect on the regional district office structure, except to name that those in the district offices who met the technical qualifications for any of the above positions to be filled received the same consideration for selection as everyone else.

In your various editorials you have referred on several occasions to "... this latest collecting of men among the clouds ..." which gives the erroneous impression to readers that there was a widespread disruption of many people in many jobs. Actually, only 52 positions were affected of the slightly more than 3,000 national positions and 790 administrative and clerical positions throughout the Office of Aviation Safety. To select the best qualified people for these 52 positions, only 56 people were considered in a physical change of station location. There were three major units at lower grades and changes in position. These three changes in station are included in the above figure. Others, of course, were promoted in grade or responsibilities as assigned but at their own request or Washington choice.

This screening process was a program, carefully planned, to evaluate individuals in order to enable us to find the best available person of technical experience and performance, coupled with managerial, leadership and supervisory abilities, to make the Washington and field organizations the same, and to simplify relations between the CAA and the industry. Time alone is sufficient to verify this fact, but not a shadow of the human, managerial and personal attributes of personnel in the Office of Aviation Safety. We are sure that you have done a great wrong to those men to us, and to aviation.

In his letter of October 31, 1951, mentioned above, to all Aviation Safety personnel, the Director of Aviation Safety closed with this thought:

"I realize that the success of any organizational rearrangement depends upon the understanding and will of the people involved to make it work. I believe this rearrangement of responsibilities will assist you in performing better than that of the several jobs. The responsibility of supervising activity in aviation is a big one, as important one, and a serious one. We cannot hope to accomplish it properly unless we work together as a spirit of cooperation and with a determination on the part of every one of us to give our best efforts to the job at hand, whatever it might be."

"Safety is no secondary need to be planned."

E. S. HENSLER, Director
Office of Aviation Safety
WILLIAM B. DAVIS, Deputy Director
Office of Aviation Safety
March 21, 1952

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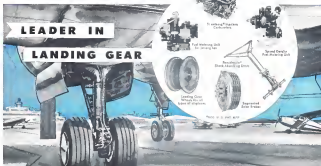



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